in the treatment of both primary and metastatic glandular lesions. Over large subcutaneous areas, as in certain types of recurrent carcinoma of the breast, the results are far superior to those obtained by the hard Roentgen rays, and many cases that have progressed rapidly under X-ray treatment, have yielded promptly to appropriate radium therapy.

Hodgkin's disease and leukemia, particularly of the lymphatic and myelogenous type, have been very favorably influenced by the application of large doses of radium emanation. In these conditions, we have frequently buried tubes within the glands and also administered, by means of intravenous injection in solution, the active deposit of radium salts. This undoubtedly hastens the recovery and adds greatly to the permanency of the result.

Time will not permit of a thorough discussion of the internal use of radium and its active deposit, obtained from the radium emanation, but I wish to call your attention to the fact that much work has been done along this line, sufficient to demonstrate its value in properly selected cases of hypertension and arthritis and to encourage more extensive studies.

Post-operative prophylactic use of radium is indicated in a limited number of properly selected cases. Such cases should be the usual early and definitely operable conditions, and the radium used only as an additional safeguard. Following radical operation for breast amputation, radium emanation may be applied through drainage tubes placed at the time of operation directly into the wound. If the tubes are properly placed, a thorough raying of the areas in which recurrence is most frequent may be accomplished. All radiation is given within two or three days, following the operation, when the tubes may be withdrawn and there results little or no interference with the primary healing of the wound. By this or similar technique, radium emanation may be employed in various other locations and conditions.

I would urge very strongly against incomplete surgery or surgery in operable cases, depending upon the post-operative use of radium to effect a cure. Such cases as a rule should much better be treated by radium alone or surgery used only as a means of assisting better approximation of the radium emanation to the involved areas.

In conclusion, I wish to say that I have not endeavored to discuss in detail the many phases of radium therapy, nor even to touch upon the broad scope of this work. It is my desire to simply call your attention to the tremendous advancement that is being made in this branch of medicine, where the work with proper facilities is being scientifically conducted.

I do not hesitate to say that I believe the next few years will see a marked reaction and severe condemnation of radium therapy, due to the fact that very generally, and in increasing numbers, this work is being carried on by men with inadequate equipment and insufficient training and experience. Fortunately, there are in this country a number of substantially endowed institutions, several co-operating with the established cancer research departments of various universities, whose work will stand out and ultimately establish the true value of radium therapy.

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Discussion opened by Dr. Clarence Moore, Los Angeles.

SURGERY OF THE CHEST. *

By CHARLES D. LOCKWOOD, M. D., Pasadena.

The world war has given a great impetus to chest surgery. This youngest of the surgical specialties has grown by leaps and bounds, and already we have an American Association for Thoracic Surgery.

The experience of surgeons in the army hospitals, both in the front areas where battle casualties furnished the bulk of the cases and also in the back areas where infection played the principal role, served to focus attention upon problems fundamental in thoracic surgery.

The organization of army hospitals afforded unusual opportunity for the study of both medical and surgical diseases. Abundance of material, freedom from the distractions of private practice, the constant availability of competent consultants, unlimited laboratory facilities and routine post-mortem examinations created conditions almost ideal for the study of disease. These ideal conditions, however, maintained only in the base hospitals. Evacuation hospitals and mobile hospitals near the front were analogous to emergency hospitals in civil life, and with the exception of a few hospitals, such as Evacuation Hospital No. 1 in France, they did not afford opportunity for completed observation and definitive treatment.

This paper is based upon personal experience in the treatment of gunshot wounds of the chest in front line hospitals and upon observation of the work done by French army surgeons both at the front and in permanent hospitals farther back.

The greatest contribution to the diagnosis and treatment of surgical lesions of the chest were made through routine X-ray examinations and bacteriological studies. X-ray examinations of the chest, in addition to the localization of foreign bodies, revealed unsuspected lung abscesses, encapsulated collections of pus in the pleural cavity and pneumothorax. The French surgeons, notably Robin and Sutro, developed a fluoroscopic method of removing small fragments of shell from the lung which enabled them to remove practically all foreign bodies in the chest with accuracy and only slight trauma. The roentgenographic study of old empyema cavities, outlined with bismuth paste, is a valuable guide to surgical treatment. The contributions of bacteriology to chest surgery is no less significant, and bacteriologic control, combined with frequent radiographic examinations, lends an accuracy to chest surgery comparable to that afforded the genito-urinary surgeon by the cystoscope and the functional tests of the kidney. Bacteriologic control in the treatment of empyema as worked out in the army hospitals has greatly helped to standardize the treatment of this disease.

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Early cultures will determine the question of when to operate. The pneumococcus infections require early drainage; streptococcus infection should not be drained until a general immunity has been established.

Bacterial cultures and counts are no less valuable guides as to when we should discontinue drainage and permit an empyema cavity to close. The Carrel-Dakin treatment of empyema cavities controlled by frequent bacteriologic examinations is ideal.

Military experience has taught us that surgery of the lungs can be brought under the same general principles as govern other organs of the body. We learned that the chest may be widely opened and explored just as the peritoneal cavity; that it was unnecessary to resort to special appliances for the maintenance of negative pressure; that one need not fear artificial pneumothorax and that it is possible to grasp the different lobes of the lung with suitable forceps and bring them into the wound for examination and the performance of necessary surgical procedures. It must not be inferred, however, from these statements that lung surgery is easy or that it should be undertaken by any but skilled surgeons. Much damage was done, I am sure, during the war by too great boldness in opening the pleural cavity. In the French army the technic of chest surgery was developed to a high degree and the mortality of chest wounds was reduced from 45 per cent. under the expectant treatment to 10 per cent. under operative treatment. The dictum which prevailed in peace times, that "bullets in the tissues were harmless and should be left alone," dominated the minds of army surgeons in the early part of the war, and wounds of the chest and lungs were last to be brought under the same principles as governed the treatment of all war wounds. Infection and suppuration occurred in almost all wounds produced by high explosives and it was soon learned that early removal of dead and infected tissues, together with the infecting foreign body, would prevent the deeper penetration of infection and quickly restore the tissues to normal. To accomplish the result it was necessary to operate within 12 to 14 hours.

These methods were found applicable to wounds of the lung. In the French army, more than in any other, surgery of the lung and thoracic cavity was developed. It became the rule to remove every foreign body from the lung. Operation was undertaken in the front line hospitals under the following conditions:

1. When there was extensive hemorrhage threatening life.
2. When there were sucking wounds threatening asphyxia.
3. When there were large foreign bodies in the lung likely to cause infection.

The smaller foreign bodies producing only mild disturbance were left for removal at the base hospitals. The technique varied with the nature and extent of the wound. In all cases requiring immediate operation, the thorax was widely opened by means of resecting a rib and then using a rib spreader. In case of severe hemorrhage, the different lobes of the lung were seized with forceps of the sponge holding variety and drawn into view, where the bleeding vessel could be ligated or a lobe resected and sutured. There was a high mortality in these cases, 40 to 50 per cent., but under the non-interference method almost all of them died.

Lung wounds containing fragments of bone, pieces of shell and clothing were treated by removal of the foreign body through the widely-opened chest. Sucking wounds threatening asphyxia were treated by excising the infected edges of the wound and tightly closing the skin over the chest wall. It was most essential that all chest wounds be closed tightly, preventing the ingress of air. It was necessary to aspirate many of these cases repeatedly for hemothorax. In a large percentage of cases after three or four aspirations the pleural cavity would clear up and no drainage was required. In a small percentage of cases empyema would develop, requiring drainage. Major Pierre Duval of the French army reports 33 consecutive operations on the chest without a death. Not only were their lives saved, but the final results were much better.

My own experience in traumatic surgery of the chest consisted of 46 gunshot wounds; 33 of these were penetrating wounds. Only one of these died as a result of lung infection. This was a desperate case with a large fragment of shell lying on the pericardium. This was removed through a wound necessitating the resection of one rib and wide separation of the adjacent ribs by means of the Tuffier retractor. The patient died of sepsis due to gas gangrene and the streptococcus hemolyticus.

The points of special interest in chest surgery brought out by our experience in the war are: (a) That non-penetrating wounds of the chest often cause serious intro-thoracic injury—e. g., hemothorax, infarction of lung, etc. (b) The lung has great resistance to infection within its substance. Lung infection was comparatively rare. (c) In severe chest injuries, lung collapse is almost invariable. (d) Pneumo-thorax, associated with a sucking wound of the chest, is a most dangerous condition and the relief afforded by closure of the wound is instantaneous and startling. (e) Gas oxygen and local anesthesia is the best method of lessening shock in chest operations.

I shall report two cases illustrating by lantern slides the value of radiography in chest surgery:

Case 1. A. B. Age 23. Pneumonia three years ago, followed by empyema, which was drained after rib resection. Sinus did not close and he continued to run an irregular temperature.

In February, 1919, Dr. F. A. Jonas of Omaha did an Estlander, resecting five ribs. There was some improvement following this operation but the discharge continued with occasional rises in temperature. January 12, 1920, this young man came under my care, having come to California in the hope that the climate would cure him. He still was running an irregular temperature and had a discharging sinus.

The empyema cavity was filled with bismuth paste and stereoscopic X-Ray plates taken. The cavity held one ounce of paste at this time (slide 1). After the first injection, the discharge ceased but the patient did not feel so well.

In two weeks, the cavity was again filled with bismuth paste, two ounces were required to fill it. Dr. Emil Beck saw the X-Rays at this time and thought the case a suitable one for the bismuth treatment. Several more injections were made at intervals of from ten days to two weeks with considerable improvement and lessening of discharge, up to March 5th. The patient then began to complain of pain in the reigion of the diaphragm when the cavity was injected, his temperature began to go up and his general condition was not so good. It required four ounces to fill the cavity.

Another X-Ray picture (slide 2) showed the cavity greatly increased in size. Operation was decided upon. On March 30th the left pleural cavity was widely opened by resecting the 10th rib and portions of the previously resected ribs. A large amount of bismuth paste and pus were evacuated, several pockets obliterated by breaking up adhesions and two large pedicled flaps of skin carried to the bottom of the cavity and tacked to the thickened visceral pleura. The entire cavity was then packed with iodoform gauze. The cavity has been packed daily until the present time.

The patient has made rapid and continuous improvement and is now doing light work.

Exhibition of patient.

Case 2. Frye. Age 38. Family history negative for tuberculosis.

January 28, 1920. Developed right lobar pneumonia, crisis on eighth day. Temperature remained normal for two weeks, when he developed a pleurisy with effusion.

March 9, 1920. Entered the Pasadena Hospital, very sick. Temperature 100.2. X-Ray picture (slide 1) showed the right pleural cavity filled with fluid, aspiration showed a sero-purulent fluid. Drainage was established by the introduction of a No. 16 catheter through a trocar. Temperature dropped to 99 degrees and remained about normal for one week.

March 23. Temperature rose to 104 degrees. X-Ray picture (slide 2) showed an interlobar collection of pus, at the level of the sixth rib. This was drained by resection of the seventh rib in the anterior auxilliary line. X-Ray (slide 3) showed tube in abscess cavity and a new abscess forming higher up to inner side of apex of the lung and near the mediastinum. Temperature dropped to 101 degrees and remained around 101 until March 31st., when another radiograph was taken, showing a well developed abscess near the mediastinum (slide 4).

April 4th. Eighth rib was resected and a portion of the seventh previously resected. Chest cavity was widely opened so that the hand could be passed up over the apex of the lung to the mediastinal abscess. Two ounces of foetid pus was evacuated and a large drainage tube introduced. After this operation patient immediately began to improve, temperature gradually returned to normal and has remained normal since. He is now almost well.

SOME FURTHER EXPERIENCES IN THE TECHNIC, NON-OPERATIVE, PRE-OPERATIVE AND POST-OPERATIVE TREATMENT OF SUPRAPUBIC PROSTATECTOMY CASES.*

By H. A. ROSENKRANZ, A. B., M. D., Los Angeles, Cal.

Hiccough: Urologists have from time to time noticed the development of a severe post-operative hiccough, so severe, that I believe, I am warranted in employing the term—pernicious—and in considering the condition as a distinct clinical entity, one that deserves special consideration as to its causes and treatment. I shall apply the term—pernicious hiccough—to those cases that are almost continuous and which interfere to such a degree with the patient's nutrition and sleep as to rapidly wear him out and to cause his death from exhaustion unless checked. The hiccough may or may not be accompanied by belching and vomiting. Williams, in his work on obstetrics, discusses pernicious vomiting of pregnancy under three groups: toxemic, reflex, neurotic. Observation has convinced me that all three of these causes may play a role in pernicious hiccough. I believe, however, that the most probable primary cause is pyelonephritis which causes a reflex or a toxemia, usually without uremia. I have seen patients die of uremia that did not have hiccough, and I have observed a most pernicious hiccough following prostatectomy that was not accompanied by uremia or by the retention of uremic products in the blood. In the case of an acute pyelonephritis it is reasonable to deduct that there is a more intense irritation of the kidney than is the case in a chronic or gradually developing uremia. May it not be, therefore, that this exceedingly acute irritation of the kidney is a reflex cause of hiccough, and a more frequent cause than is the irritation caused by uremic products on some other part of the anatomy. Also I believe it to be more probable that bacterial toxins in the form of a toxemia may be an important cause, of more importance than uremia. We are familiar with the varied and striking reflex symptoms produced in that acute condition known as Ditl's Crisis; also with the fact that floating kidney is a cause of asthma; so that it does not appear far fetched to attribute some of these hiccoughs to acute irritation of the kidney, and perhaps, to irritation upon the patient's anatomy of bacterial toxins rather than to the irritation produced by uremia products, since in no case of pernicious hiccough have I demonstrated uremic retention products in the blood. I have observed that a serious hemorrhage is apt to be followed by pernicious hiccough, as is also the removal of an exceedingly large prostate.

Treatment: Although the pernicious form is usually ushered in by several days of mild hiccough, if this mild form does not promptly yield to ordinary remedies, I believe that we should resort at once to the most effective measures, checking the hiccough before the pernicious stage is reached, so that the patient's strength may be kept from ebbing away from starvation, and from the exhaustion produced by constant spasmodic contracture of his chest and abdominal muscles and from loss of sleep. The patient is better able to stand heroic treatment at the relatively mild beginning of a stubborn hiccough than he is just before his exitus. All medicine and food by mouth should be prohibited and the stomach should be washed out with a ½ per cent. soda bicarbonate solution two or three times daily. Hot compresses are of considerable value even in the pernicious form. 2000 or 3000 cc. of a ½ of 1 per cent. soda bicarbonate plus 5 per cent. glucose solution should be administered during each 24 hours, preferably per rectum by the drip method or it

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